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PG&E Letter DCL-06-019

U.S. Nuclear Regulatory Commission
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Docket No. 50-323, OL-DPR-82
Diablo Canyon Unit 2
Supplement 2 to Relaxation Request for NRC Issuance of First Revised Order (EA-03-009) Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors

Dear Commissioners and Staff:

On February 11, 2003, the NRC issued Order EA-03-009 for interim inspection requirements for reactor pressure vessel heads at pressurized water reactor facilities. On February 20, 2004, the NRC issued the First Revised Order EA-03-009, which superseded Order EA-03-009. Revision 1 of the Order modified the requirements regarding nondestructive examination of the head penetration nozzles.

Pacific Gas and Electric Company (PG&E) provided responses consenting to the Order and Revision 1 of the Order in PG&E Letter DCL-03-022, "Twenty-Day Response to NRC Order Modifying Licenses (EA-03-009)," dated February 28, 2003, and PG&E Letter DCL-04-021, "Twenty-Day Response to First Revision of NRC Order Modifying Licenses (EA-03-009)," dated March 11, 2004, respectively.

PG&E Letter DCL-04-146, "Relaxation Request for NRC Issuance of First Revised Order (EA-03-009) Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors," dated October 26, 2004, transmitted PG&E's request for relaxation of the Order requirements for Unit 2 of the Diablo Canyon Power Plant (DCPP).

PG&E Letter DCL-04-158, "Supplement to Relaxation Request for NRC Issuance of First Revised Order (EA-03-009) Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors," dated November 12, 2004, provided to the NRC the coverage achieved in Unit 2 refueling outage twelve (2R12), which defined the scope of the relaxation request for DCPP Unit 2.

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In PG&E Letter DCL-04-158, PG&E stated:

> *Penetrations 35 and 55 are 30.2 and 38.6-degree penetrations, respectively. The measured coverage below the weld on both penetrations was 0.31 inches. Using the WCAP flaw growth curve associated with the 26.2-degree angle (nearest lower angle for which a conservative curve was calculated), the time for a postulated flaw, located 0.27 inches below the weld, to propagate to the weld was calculated to be approximately 1.2 EFPY. Westinghouse developed a conservative crack growth curve, assuming that the upper extremity of an axial through-wall flaw is located at 0.27 inches below the weld (conservatively accounting for the measurement uncertainty of ± 0.04 inches), for penetrations 35 and 55, using the stress distribution profile below the weld generated for penetrations with a nozzle angle of a 26.2-degree penetration tube. The resulting crack growth curve, as shown in Figure 1, indicates that it would take a minimum of 1.44 EFPY for any undetected flaw in the region not inspected to reach the bottom of the J-groove weld. This demonstrates that DCPP Unit 2 can safely operate until the next inspection is performed.*
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> ...
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> *PG&E recommends the relaxation be approved for one operating cycle, until the next scheduled volumetric head inspection is performed in 2R13. PG&E plans to provide penetration angle-specific flaw growth rate curves for penetrations 35 and 55 in support of operating cycles greater than that supported by the conservative 26.2 degree crack growth curves. Additional data will be provided at a later date to support a relaxation request for subsequent Unit 2 operating cycles.*

The NRC approved relaxation of the inspection requirements for DCPP Unit 2 by NRC letter dated November 23, 2004. The NRC stated:

> *The measured coverage was sufficient to provide at least 1.44 effective full power years (EFPY) until the postulated flaws would reach the weld metal. Cycle 13 is designed for an 18-month cycle with a core design of 1.33 EFPY. Therefore, the next inspection will be conducted prior to the time that the postulated flaw would be expected to grow to intersect the weld. This demonstrates that DCPP Unit 2 can safely operate until the next inspection is performed in DCPP Unit 2 refueling outage thirteen (2R13). If there were a flaw as postulated above, it would be detected during the next inspection and corrective actions would be taken.*

Subsequent to the 2R12 volumetric examination, Westinghouse provided PG&E with axial through-wall crack growth curves for 30.2 degree and 38.6 degree nozzle penetrations, based on as-designed weld configurations.

In addition to the as-designed flaw growth curves, Westinghouse performed a finite element analysis to evaluate the impact of larger fillet weld sizes found in the as-built J-weld configurations of control rod drive mechanism penetration number 35 (30.2 degrees) and penetration number 55 (38.6 degrees). The evaluation concluded that the as-designed crack growth charts are conservative if the as-built weld sizes are larger than the as-designed weld sizes.

In PG&E Letter DCL-05-067, "Relaxation Request for NRC Issuance of First Revised Order (EA-03-009) Establishing Interim Inspection Requirements for Reactor Pressure Vessel Heads at Pressurized Water Reactors," dated May 27, 2005, PG&E provided the NRC with a DCPP Unit 1 relief request similar to the one provided for DCPP Unit 2. In DCL-05-067, PG&E provided the additional crack growth curves for the 30.2 degree and 38.6 degree nozzle penetration angles, which demonstrated that the minimum time for a flaw to propagate from 0.3 inches below the weld to the bottom of the J-groove weld for the 30.2 degree and 38.6 degree penetrations would be at least 1.8 EFPY, which is greater than one operating cycle.

The NRC approved the DCPP Unit 1 request for relaxation by letter dated October 26, 2005. The NRC stated:

> *The NRC staff concludes that the licensee's proposed alternative inspection of DCPP Unit 1's VHP nozzles, to perform the UT examination below the J-groove weld to the maximum extent possible with a minimum inspection distance of 0.3 inches below the J-groove weld, as conditioned, provides reasonable assurance of the structural integrity of the RPV head, VHP nozzles, and welds. Further inspections of these VHP nozzles in accordance with Section IV.C.(5)(b), of the First Revised NRC Order EA-03-009 dated February 20, 2004, would result in hardship without a compensating increase in the level of quality and safety. Therefore, pursuant to Section IV. F., of the First Revised Order EA-03-009 dated February 20, 2004, the NRC staff authorizes the proposed alternative inspection as stated above for the HP nozzles (identified above in Section 2.2, Table 1) at DCPP Unit 1, until the First Revised NRC Order EA-03-009 is replaced or rescinded, subject to the following condition:*

If the NRC staff finds that the crack-growth formula in industry report MRP-55 is unacceptable, then PG&E will revise its analysis that justifies relaxation of the Order within 30 days after the NRC informs PG&E of an NRC-approved crack-growth formula. If PG&E's revised analysis shows that the crack-growth acceptance criteria are exceeded prior to the end of the current operating cycle, this relaxation request will be rescinded and PG&E will, within 72 hours, submit to the NRC written justification for continued operation. If the revised analysis shows that the crack-growth acceptance criteria are exceeded during the subsequent operating cycle, PG&E will, within 30 days, submit the revised analysis for NRC review. If the revised analysis shows that the crack-growth acceptance criteria are not exceeded during either the current operating cycle or the subsequent operating cycle, PG&E will, within 30 days, submit a letter to the NRC confirming that its analysis has been revised. Any future crack-growth analyses performed for this and future cycles for RPV head penetrations must be based on an acceptable crack-growth rate formula.

The DCPP Unit 2 Order Inspection Category, in accordance with Section IV, Paragraph A, is determined to be "high," based on an approximate 13.09 effective degradation years (EDY) at the beginning of the 2R13.

The additional 30.2 degree and 38.6 degree nozzle penetration crack growth curves provided in DCL-05-067 (figures 9 and 10, respectively) are applicable to Unit 2.

PG&E hereby requests that the relaxation granted by the NRC for DCPP Unit 2 be modified to be consistent with the relaxation granted for DCPP Unit 1, based on the justification provided in DCL-04-146, DCL-04-158, and DCL-05-067.

Specifically, PG&E requests the following:

(1) Revise the minimum coverage required below the J-groove weld for Unit 2 to be the maximum extent possible with a minimum inspection distance of 0.3 inches below the J-groove weld for DCPP Unit 2.

(2) Revise the duration of the relaxation for Unit 2 to be until the First Revised NRC Order EA-03-009 is replaced or rescinded, subject to the following condition (consistent with Unit 1):

If the NRC staff finds that the crack-growth formula in industry report MRP-55 is unacceptable, then PG&E will revise its analysis that justifies relaxation of the Order within 30 days after the NRC informs PG&E of an NRC-approved crack-growth formula. If PG&E's revised

analysis shows that the crack-growth acceptance criteria are exceeded prior to the end of the current operating cycle, this relaxation request will be rescinded and PG&E will, within 72 hours, submit to the NRC written justification for continued operation. If the revised analysis shows that the crack-growth acceptance criteria are exceeded during the subsequent operating cycle, PG&E will, within 30 days, submit the revised analysis for NRC review. If the revised analysis shows that the crack-growth acceptance criteria are not exceeded during either the current operating cycle or the subsequent operating cycle, PG&E will, within 30 days, submit a letter to the NRC confirming that its analysis has been revised. Any future crack-growth analyses performed for this and future cycles for RPV head penetrations must be based on an acceptable crack-growth rate formula.

In addition to the justification provided in DCL-04-146, DCL-04-158, and DCL-05-067, PG&E will be performing modifications to Unit 2 during 2R13, which will lower the upper head temperature, resulting in additional time before a postulated flaw in the unexamined area of the penetration nozzle would propagate into the pressure boundary formed by the J-groove weld.

In order to support restart from 2R13, PG&E requests that the NRC review and approve the associated relaxation request by April 14, 2006.

If you have any questions or require additional information, please contact Stan Ketelsen at (805) 545-4720.

Sincerely,

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